

Dorothy De Clow

MORE PROFIT

from the Dairy Herd



TABLE of CONTENTS

1. Early history of commercial mineral feeds	Page 3
2. There are two common kinds of mineral feeds	" 3
3. Mineral found in common feeds	" 4
4. Why the mineral content of feeds vary	" 5
5. Minerals cannot be entirely supplied by ration	" 5
6. How much calcium or lime will a balanced dairy ration supply?	" 6
7. Minerals have many uses in the animal's body	" 7
8. Selecting ingredients for mineral feeds	" 8
9. How mineral ingredients vary	" 9
10. The ingredients of Rawleigh's Minerals for Cattle and what they do	" 10
11. Many minerals not as represented	" 11
12. Some factors influencing mineral digestion	" 12
13. Mineral content of roughage determines production	" 13
14. Why your cattle need minerals now	" 13
15. Dangers from using improperly prepared minerals	" 14
16. You can assist minerals by good feeding	" 15
17. Signs of deficiency diseases in cattle	" 15
18. Mineral deficiency causes breeding diseases	" 18
19. Depraved appetite in cattle	" 18
20. Stiffness in milk cows	" 20
21. Bone chewing of cattle	" 22
22. Do not lose your calves from goitre or big neck	" 22
23. Better young from mineral fed cows	" 23
24. How minerals increase production	" 25
25. Use minerals long enough to get results	" 25
26. Minerals do not cure contagious abortion	" 26
27. The amount of mineral you should buy	" 26
28. What does it cost to feed minerals?	" 27
29. Adding your own salt reduces cost	" 27
30. Rawleigh's manufacture a quality mineral feed	" 28
31. Advantage of buying Rawleigh's Minerals for Cattle	" 29
32. Some common cattle diseases and conditions with suggestions for treatment	" 30
Farm and dairy disinfection	" 31
Good feeding improves the health of your herd and increases your profit	" 32

Compiled by

THE RAWLEIGH VETERINARIAN

THE W. T. RAWLEIGH COMPANY
FREEPORT, ILL., U. S. A.

MEMPHIS CHESTER OAKLAND MINNEAPOLIS
RICHMOND DENVER MONTREAL WINNIPEG

Copyrighted 1928





More Profit from the dairy herd

I

Early History of Commercial Mineral Feeds

Commercial mineral feeds have been developed within the last ten years. The first experiment station to attract attention from their experiments with minerals was the Iowa Experiment Station, which began their first experiments nearly fifteen years ago.

In the early 80s an employee of the United States Department of Agriculture who was working with hog cholera control developed a mixture that was made up largely of sodium salts, which was highly recommended for use in the control of hog cholera, which was at that time a very serious disease. Various modifications of this mixture resulted during the next few years after it was published by the United States Department of Agriculture, with the result that many individuals engaged in the manufacture of preparations which were called by various names, such as stock powders, regulators, tonics, etc.

Many of these companies prospered during the years that followed, and when mineral feed experiments were published, made slight changes in their products and immediately began to cash in on the popularity of the new discovery in animal nutrition.

Needless to say, many of these products did not undergo any great change. Several of them were not changed at all, (as far as can be determined) while others had but slight changes made in the ingredients used, or some form of calcium or lime was added to the mixture.

Due to this class of products being sold for mineral feeds, there has been considerable damage done to the industry because the preparations sold as mineral feeds were not mineral feeds at all, but were simply the old stock powders which consisted usually of large quantities of Glauber Salts and other soda salts with a very small quantity of drugs, principally in the form of appetizers.



Due to the fact that many of the manufacturers of the old stock powders that had been sold for many years were reluctant to make any change in their product and further because of the fact that they did not have sufficient training and experience to enable them to make mineral feeds, many of them simply changed the name of their product, and called it a mineral feed and by such a name it has been sold.

II

There Are Two Common Kinds of Mineral Feeds

The mineral feeds on the market are divided into two classes; simple mineral mixtures and complex mineral mixtures. This division has resulted because of the trend of experimental work with minerals at one of the leading Agricultural Experiment Stations. When the first experimental work

was done with minerals it was done with swine and most of the experiments were conducted with mixtures containing several different ingredients; as many as ten or twelve ingredients being used in some of the early mixtures. Few of the mixtures contained less than eight or nine ingredients.

Later on in the experimental work at this experiment station some work was done with simpler mixtures made up principally of calcium, phosphorus, salt and iodine. Some of the manufacturers who could not compete with the more complex mixtures because of the necessity of purchasing large quantities of raw materials, and because of the lack of knowledge required, adopted the simple mixture and have exploited it almost exclusively.

Many of these so-called simple mineral mixtures are not at all as simple as they appear. The calcium carbonate in several of these mixtures contain such minerals as magnesium, iron, alumina and silica, as well as occasionally some other ingredients. The calcium phosphate used in these mixtures is also a complex mineral containing several different elements in addition to the calcium and phosphorus which make up about two-thirds of its content. Therefore, while many Experiment Stations have claimed they secure wonderful results from a simple mineral mixture we question whether or not these results should be claimed for a simple mineral mixture, because the complexity of the ingredients used makes of this so-called simple mixture a highly complex mineral mixture.

The complex or complete mixtures as they are commonly called, contain in addition to calcium, phosphorus, salt and iodine mentioned above, such minerals as potash, sulphur, iron and occasionally alumina and manganese. High grade complex mineral mixtures base their composition upon the different mineral ingredients found in common feeding stuffs, as well as the mineral ingredients ordinarily found in representative soils. Since calcium and phos-

phorus are found in the soils in large amounts and are frequently deficient to the extent that animals suffer because there are not sufficient quantities in the crops, it is reasonable to suppose that those minerals, such as sulphur, potash, iron and magnesium which are found in much smaller amounts are likewise just as often deficient and therefore the animals suffer more than we commonly believe from a deficiency of these minerals.

Several Experiment Stations have stated that cattle do not require other minerals in addition to calcium, phosphorus, sodium and iodine, but no Experiment Station to the best of our knowledge has any controlled experiments to back up their statements.

From observation and a wide experience with minerals we can assure the cattle owner that more satisfactory results will be secured from the use of a complex mineral mixture (such as Rawleigh's Minerals for Cattle) under ordinary herd conditions than can be expected from the more simple mixtures that are sometimes recommended. Until such time as some controlled experiments with chemically pure ingredients are made, we must discount the statements made about the results secured with a simple mineral mixture, because to the best of our knowledge no really simple mixture such as is commonly discussed has ever been used. The ordinary simple mineral mixture as mentioned elsewhere in this discussion contains in addition to calcium, phosphorus, sodium and iodine, such minerals as iron, sulphur, silica, carbon, alumina, etc. Therefore, the mixtures that have given these excellent results have been very complex mineral mixtures.

III

Minerals Found in Common Feeds

Pounds Per 2000 Pounds

Feed	Calcium	Phosphorus	Other Minerals	Total Minerals
Corn	0.4	5.5	28.5	34.4
Wheat	1.2	7.5	41.60	50.30
Oats	2.0	8.0	65.76	75.76
Wheat Bran	2.5	22.0	102.18	126.68
Skimmilk	3.0	2.0	11.42	16.42
Gluten Feed	5.0	11.0	55.8	71.8
Corn Silage	3.5	1.5	23.8	28.8
Corn Stover	10.0	2.0	61.82	73.82
Linseed Meal	7.5	14.0	94.38	115.88
Timothy Hay	3.5	2.25	52.79	58.54
Clover Hay	24.0	3.5	66.44	93.94
Alfalfa Hay	21.0	4.5	110.86	136.36
Cottonseed Meal	5.5	27.0	114.98	147.48
	88.1	110.75	830.33	1029.18

A study of this table showing the relation between calcium, phosphorus and the other minerals in some common feeds, is significant of the statement often made

that there is just as often a deficiency of some other minerals in feeds, as there is of calcium and phosphorus. These figures show that there is about $9\frac{1}{2}$ times as many other minerals (excluding phosphorus) in the common feeds used to secure these figures; that there is $7\frac{1}{2}$ times as much of the other minerals (excluding calcium) as there is phosphorus in these feeds.

Can there be any logic then to the statement so often made that there is under or-

dinary conditions no need for any other minerals other than calcium and phosphorus when the analyses of these common feeds show that the total amount of other minerals is $4\frac{1}{4}$ times that of the total for calcium and phosphorus? These figures indicate conclusively that all minerals are likely to be deficient in crops that are produced on land that has not been properly fertilized for the purpose of replacing these minerals that are removed by the crops.

IV

Why the Mineral Content of Feeds Vary

The principal reason why the mineral content of feeds vary is due to the fact that through long continuous cropping there has been removed from the soil greater amounts of minerals than have been replaced. This is true of the farm land in most sections of the United States that has been cultivated for 25 years or more. The natural fertility has been greatly reduced through continued cropping.

Another factor that influences the mineral content of feeds is the weather conditions. During certain seasons due to weather conditions, the crops may be deficient in minerals. More favorable weather conditions may result in the growing of crops from the same land that will have considerable greater quantities of minerals.

It has been learned through controlled experiments that it is possible to increase the mineral contents of the crops through the application of mineral elements to the soil. It was found at the Michigan Experiment Station that it was possible to increase the amount of lime in alfalfa over five times by adding calcium or lime to the soil. It was also found that by adding phosphorus fertilizer to the soil that the amount of phosphorus in the alfalfa can be increased four times over that of alfalfa produced on soil that did not receive phosphorus. This study indicates one very good reason that certain crops have a greater feeding value than other crops. Many cattle owners have noticed this for years, but could not explain it.

V

Minerals Cannot Be Entirely Supplied by the Ration

We know that there are several dairy feeding authorities who make the statement that in their opinion certain types of rations supply all of the minerals that are required by the high producing dairy cow. From our experience and observation, we disagree with this statement. In the first place, regardless of how good a ration may be, it cannot supply sufficient salt (sodium chloride) for the animal's needs and we have rarely ever seen a dairy ration that was so well balanced that the addition of high grade steamed bonemeal did not improve it and increase the health of the herd consuming it, as well as prolonging their production.

We believe that it is possible to develop a ration that will carry the herd for a long

time before very noticeable results due to mineral deficiency are seen, but nevertheless results do show up in time which are evidently the result of a deficient supply of minerals in the feed. Nature protects the high producing dairy cow in many instances, because the cow will dry off several weeks before the next calving time and in this interval she will store up within her body large amounts of minerals to replace the quantity that has been withdrawn during the previous lactation period.

Another way that nature takes care of this mineral deficiency in high producing cows is failure of the cow to breed promptly after calving. Practical dairymen recognize the fact that high producing cows breed more surely and regularly shortly af-

ter calving than they do several weeks later. Experienced dairymen therefore usually breed their best cows as soon after calving as possible, because if several weeks elapse the mineral reserve of these high producing cows will become lowered and the result is that these animals do not get with calf quickly.

In our own herd which has an actual production of 15,670 lbs. of milk for 32 head (all animals of milking age in our herd for 1927), as well as many other high producing herds which we have been privileged to observe and study, we have concluded that it is impossible to make the

dairy cattle ration from ordinary feeds efficient from a mineral standpoint in every particular. We have found that regardless of how good the ration is, it can always be improved by the addition of the right kind of minerals. We do not conclude that minerals will eliminate every danger or will always make a complete ration. We understand that there are certain factors that have a distinct bearing on the efficient utilization of the dairy ration, therefore we consider minerals a very important part of the dairy ration. In fact, just as important as the proteins, carbohydrates, fats, etc., and every progressive dairyman should consider it in the same manner.

VI

How Much Calcium or Lime Will a Balanced Dairy Ration Supply?

You frequently hear dairy feeding authorities make the statement that if your cows are securing a balanced ration with which alfalfa hay is used, that they do not need any calcium or other minerals—that this ration will supply all the calcium and minerals that they require.

In order to prove to you the absurdity of this statement, we want to take as an example the ration fed to Lady Piebe Oak Homestead, the Illinois State Champion in the 500 pound fat club for 1927, and figure out for you just the amount of calcium and phosphorus this ration supplied and then compare it with the amount of calcium and phosphorus that she required for body maintenance, the manufacturing of 25,000 pounds of milk, and the development of a calf.

This cow's ration consisted of the following feeds:

Beet Pulp	1620 lbs.
Corn Silage	5117 lbs.
Alfalfa	4122 lbs.
Corn	1264 lbs.
Oats	1406 lbs.
Wheat Bran	805 lbs.
Oilmeal	750 lbs.
Cottonseed Meal	683 lbs.
Gluten Meal	356 lbs.
Distiller's Grains	322 lbs.

Based on a year's feeding of 365 days, this cow consumed $15\frac{1}{3}$ pounds of grain and $29\frac{2}{3}$ pounds of roughage, or a total of

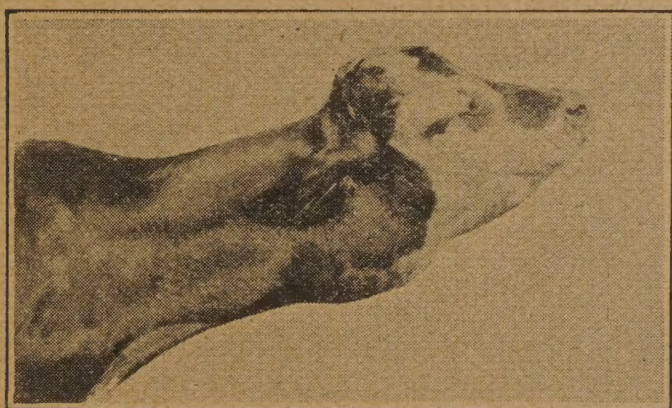
45 pounds per day. The above feeds contain a total of 72.54 pounds of calcium and 47.01 pounds of phosphorus. The water given this cow was hard water and would probably supply 8 pounds additional calcium, making the total calcium consumed by this cow 80.54 pounds for the year.

Each 1000 pounds of milk contains 1.8 pounds of calcium; therefore, 25,000 pounds of milk would contain 25 times 1.8 pounds or 45 pounds. This cow would require not less than 35 pounds of calcium for body maintenance and not less than 15 pounds of calcium for the production of her calf. This would make a total requirement of 95 pounds of calcium required for the year, not taking into account the fact that all of the calcium supplied in the mineral mixture supplied this cow was not digestible.

There is no accurate measurement of the amount of calcium that can be assimilated under ordinary conditions, as there is an individual difference in cows, but it is safe to presume that this cow required a ration that supplied at least 150 pounds of calcium while making such a large record as this. We have no way of knowing just how much calcium this cow stored up in her body, but we presume that it must have been a very large amount because she was given a dry rest period of approximately four months. During this time, it would be possible for this cow to store up in her body 25 pounds or more of calcium and nearly the same amount of phosphorus.

Experienced dairymen know that any high producing cows can only be kept producing large quantities of milk by giving them a long rest period between lactation periods. Cows in our herd from which we expect a production of around 25,000 pounds, are given from three to four months rest between lactation periods.

It is evident that the ration fed to Lady Piebe Oak Homestead could not be greatly improved upon and that it supplied a considerably larger quantity of minerals, and especially calcium and phosphorus, than the average ration supplies. The average dairy ration, even though balanced and containing alfalfa hay (as roughage) and oil-meal or cottonseed meal (as protein concentrate) will not supply more than 50 pounds



This calf was affected with goiter and was dead at birth. In many herds the calves are all affected with this disease. Many of them die soon after birth. This condition may be prevented by supplying their dams with Rawleigh's Minerals for Cattle during the gestation period.

of calcium per year. The average cow producing 10,000 pounds of milk will require not less than 18 pounds of calcium for the production of milk alone, in addition to 50 pounds of calcium required for body maintenance and the development of her calf. Therefore, not making any allowances for any calcium that might not be desirable, it is impossible with the average balanced ration to supply within 18 to 20 pounds of the amounts of calcium required for the average cow producing 10,000 pounds of milk; therefore, we must presume that under no conditions is it possible to supply adequate amounts of calcium and phosphorus, and other minerals with the average grain or roughage ration, even though it is properly balanced and the richest mineral feeds are used.

The reason that many cows fed on such rations do not suffer from mineral deficiency is because they store up large amounts of calcium and other minerals in their body during the dry period, or else due to the fact that the quantity withdrawn from their body is not sufficiently great to produce any noticeable diseased condition before they dry off, or before additional amounts are supplied in their feed.

Cattle require about 1.8 times as much calcium as they do phosphorus; therefore when the calcium requirements are known, it is a very simple matter to determine the phosphorus requirements of the milk cow.

VII

Minerals Have Many Uses in the Animal's Body

Most cattle owners are of the opinion that minerals for cattle are of value only for building bones or for development of the skeleton. While it is true that this is one of the most important uses of minerals, there are other uses but slightly less important than this. It is a fact demonstrated beyond all doubt, that animals will die much quicker from a demineralized feed than they will from complete starvation. The reason for this is that minerals are required for the regulation of practically all body functions, and for this reason few if any normal functions exist very long without the presence of minerals. Death results in a very short time when there are no minerals included in the ration.

The reason death occurs more rapidly in animals fed a demineralized ration is

due to the fact that there are developed in the digestive system, dangerous poisonous acids which result from the digestion of certain food ingredients. Minerals protect the animal against these poisons by taking these poisons and changing them into products that are not poisonous.

Each and every cell in the animal's body is bathed in a solution of minerals, and when this solution is deficient for any reason certain changes usually take place in the cells which result in lessened activity, and often in sickness or death. The activity of the different cells of the body depends largely upon the amount and kind of minerals that are supplied them.

The mineral content of the various body fluids, such as the blood does not vary to any great extent. When there is much

variation in the mineral content sickness and disease result. If there is a deficiency of calcium in the blood, it does not clot properly and in addition to this there would be a disturbance of the heart. The muscles do not contract properly. Slight injuries to animals in this condition will usually result in fatal hemorrhages. Other minerals have similar actions, and it is through a correct balancing of these minerals that normal health is maintained.

In order that the various parts of the body may be properly and adequately repaired, it is necessary that those minerals be supplied in the feed for the cattle to eat. The growth of the young depends in a large measure upon the correct amount and the right kinds of minerals. Without an adequate mineral supply it is impossible

for the animal to maintain itself, or to reproduce successfully.

There is not a single process going on in the animal's body that is not regulated largely by the mineral supply that it receives. Each cell of the animal's body has the power of selecting the particular minerals they need for the correct functioning and for the repair that is necessary for it. While each cell has the property of selecting the particular minerals that it requires, there is a danger in supplying too large amounts of minerals of certain kinds because of the detrimental effect a certain mineral may have on certain other minerals. As an example, an excess of magnesium will have a tendency for a withdrawal of calcium from the bones. Even excessive amounts of calcium will in unusual cases have the same effect.

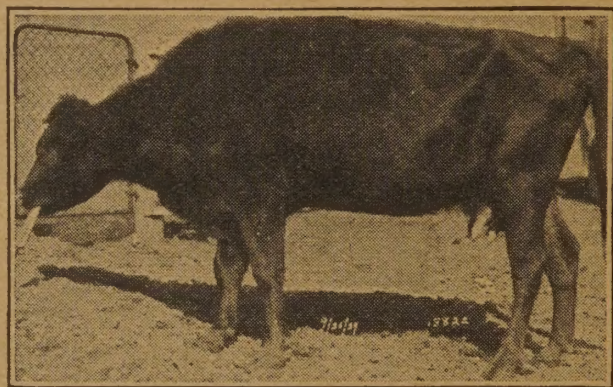
VIII

Selecting Ingredients for Mineral Feeds

In order to manufacture a mineral feed that is desirable from a nutritional standpoint, it is absolutely necessary to understand fully the dairy cow's mineral requirements. It is also necessary to know the minerals that are ordinarily found in the soil and which minerals are likely to be deficient. It is likewise advisable to understand the mineral content of the ordinary feeds commonly used for cattle, and the minerals that are often deficient.

In the selection of ingredients for mineral feeds it is necessary to understand in addition to the animal's requirements and the usual deficiencies in the feed, the difference between various mineral salts. The manufacturer must know the source of the minerals he is using in his mixture, and whether or not there are any dangerous impurities in them.

In the manufacture of mineral feeds there are many ingredients used of doubtful value and questionable purity. Many manufacturers not having a chemical or medical training do not understand that different salts of the same family may have very different actions. The name may be very similar, yet one product may be desirable for internal use, while another of practically the same name may be very dangerous to use. It is because of this ignorance on the part of many manufacturers that many so-called mineral mixtures have



(Minnesota Experiment Station)

This cow received a ration that was deficient in minerals. She developed depraved appetite and became a bone chewer. The ration contained more digestible nutrients than are ordinarily required. She became unthrifty, lost flesh and decreased in milk production.

been placed on the market that have little or no value because of the nature of the ingredients used.

Many of the ingredients used in mineral feeds are highly complex chemicals and for that reason, no one save a chemist or medically trained individual should attempt to manufacture products from such ingredients.

Many of the manufacturers of so-called mineral feeds select their ingredients from some supposed beneficial action that a certain product may have. A study of the many ingredients found in some of these so-called mixtures brings to light a large number of ingredients that have not been

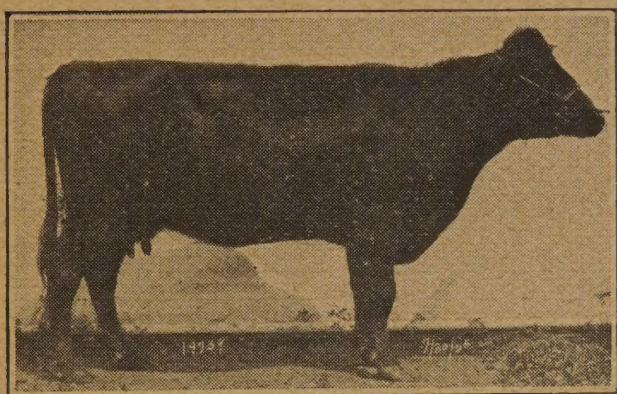
used for many years for livestock. Some of these have absolutely no beneficial effects for the livestock that consume them and others are actually dangerous.

A few manufacturers select their ingredients mostly on the price and not from the value that will result from the livestock that consumes their product.

In order to buy mineral feeds safely and intelligently, it is necessary to know whether or not the manufacturer has the educational requirements, as well as the practical experience which will enable him to manufacture a safe product and one that will supply the mineral needs of the herd to which it is fed.

IX

How Mineral Ingredients Vary



(Minnesota Experiment Station)

The same cow as shown (opposite page) after having the deficient minerals added to her ration. No other change was made in her feeding. Note the difference in condition.

We want to call your attention to the extreme variation between some of the ingredients used in mineral feeds. You will understand that the same chemical name is given for each of these products, yet the composition is greatly different.

There are used in mineral feeds as calcium carbonate, products that vary in their calcium carbonate content from 45% to 98% of actual calcium carbonate. In one large quarry in the State of Iowa six samples of limestone were analyzed from different parts of this quarry which showed a variation from 67.40% to 87.87% of calcium carbonate. These same samples showed a variation of magnesium carbonate from 1.12% to 6.85%, iron oxide, .49% to 1.42%, alumina, 3.78% to 8.01% and silica (sand) 1.95% to 19.96%. It requires but little thought to prove to the thinking dairy cattle owner that it is not always advisable to purchase a mineral feed from a manufacturer unless you are reasonably sure they understand the chemistry of the ingredients they are using and are using only high grade ingredients.

In the use of calcium carbonate in mineral feeds, some manufacturers use a dolomitic limestone which ranges in calcium

carbonate content from 47% to 98%. In exceptional cases such limestone will contain 20% or more of sand (silica), and as much as 8% or 10% of iron, as well as other ingredients which are not desirable when combined with calcium carbonate. The purchaser who has not made an exhaustive study of mineral feeds has no way of knowing the purity of the ingredients used in the mineral feed he purchases. Therefore, it is always well to purchase mineral feeds from a reliable manufacturer.

For illustration, a high grade steamed bonemeal finely ground and containing 68% bone phosphates of lime is very desirable for feeding cattle, as well as other livestock. However, ordinary ground rock phosphate containing from 4% to 6% of fluorine is undesirable because of the poisonous amounts of fluorine found in this product, as well as the other undesirable minerals combined with it, such as iron, alumina, silica (sand) and others. A ground rock phosphate frequently contains as much as 20% of sand, the product sells for \$9.00 or \$10.00 per ton. In many instances it does not have greater feeding value than its price would indicate when compared with high grade bonemeal.

Carefully controlled experiments have shown that 1/40 of 1% of fluorine in the ration interferes with reproduction and that 1/6% to 1/4% of fluorine in the ration interferes with growth and well being and will shortly result in death. There are many cheap, inferior mineral feeds that contain ground rock phosphates which contain the amount of fluorine given above. Therefore, in purchasing mineral feeds the purchaser should insist on getting a mineral feed in which no ground rock phosphate is used. If it is used the manufacturer should guarantee that the completed mineral mixture does not contain more than 1/40 of 1% of

fluorine. The manufacturer should purchase ground rock phosphate, (if purchased at all) that does not contain more than 1% to 1.5% of fluorine if he intends to use more than 25% of rock phosphate in his mineral feed; otherwise there will be a dangerous amount of fluorine in the completed mineral mixture. There is on the market at this time, a high grade calcium phosphate from rock which contains around .62% of fluorine; this amount of fluorine would not be dangerous, even though the mineral mixture contained 35% of calcium phosphate

from this source and 5% of the mineral mixture was added to each 100 pounds of the feed consumed by the animal.

Considerable variation could be shown for most of the other ingredients used in mineral feeds, but by illustrating the two that are most commonly used and are best understood we feel that you will realize the importance of using a mineral feed that is manufactured by those in whom you can have the greatest confidence and those whom you believe have the ability to manufacture a desirable product.

X

The Ingredients of Rawleigh's Mineral Feed and What They Do

We do not expect you to fully understand just what mineral ingredients are necessary for a quality mineral feed and what they do, but we believe we can tell you from our extensive training and experience just what constitutes satisfactory ingredients and what they will do for your herd.

Calcium carbonate is the most satisfactory form of lime for feeding livestock and should be from 95% to 98% pure. Ordinary ground limestone or ground rock usually contains large quantities of sand, iron, alumina and other materials which should not be used in excessive amounts. As a general thing, there is too much waste material in ordinary ground limestone. A desirable form of calcium carbonate should be finely ground. A desirable fineness is 90% of the material through a 200 mesh screen. This enables the cattle to digest it easily.

Calcium carbonate is antacid, helps tone up the muscles, assists in regulating the contraction of the heart, prevents acidity; helps prevent rickets and bone diseases; assists in clotting of the blood; together with phosphorus it comprises 90% of the material of the skeleton of the body and 75% of the total mineral content of the entire body.

Calcium phosphate for livestock feeding should be made from fresh, clean bones, from healthy, slaughtered livestock and

should contain not less than 65% of bone phosphate or lime. It should be finely ground and should be free from odor. In many cheap, inferior mineral feeds the calcium phosphate content is supplied by ordinary ground rock phosphate which usually contains from 4% to 6% of fluorine, which is a very dangerous poison in such amounts if fed to cattle over a long period of time. Ground rock phosphate is therefore very undesirable and unsafe to use. In addition to this disadvantage, it is very



unpalatable and it is only with difficulty that cattle can be induced to eat it.

Calcium phosphate is necessary for relaxation of the heart and muscles; assists protein digestion; helps prevent rickets and other bone diseases.

Ferrous sulphate (iron) is an important ingredient in the blood. Young animals at birth have large amounts of iron stored in the liver. It is evident that this excessive amount of iron is necessary because milk which is nearly always the sole food of the young is deficient in iron. Iron helps the blood to carry oxygen to the tissues; is useful as a tonic; helps prevent chronic indigestion.

Sulphur is an alterative; increases secretion of the intestines and is closely associated with proteins of the feed. It is said to be a very desirable mineral for the improvement of hair, horns, hoofs, etc.

Magnesium sulphate (epsom salts) increases intestinal secretion, also activity of the bowels; helps to prevent the formation of an excess of acid during digestion.

Potassium sulphate helps regulate the secretions in the digestive tract, and also gives firmness to the body tissues.

Sodium bicarbonate (baking soda) assists digestion in the stomach; renders the blood and bile alkaline; helpful in preventing intestinal indigestion and bloating. It is a carminative and stomachic.

Potassium iodide (iodine) prevents goitre or big neck in the young; stimulates glandular activity. This mineral is evidently one of the most important that we have knowledge of at this time.

Please note that there are no wood ashes, rock phosphates or other undesirable cheap ingredients in Rawleigh's Minerals for Cattle.

XI

Many Minerals Not as Represented

Since the popularity of mineral feeds there have been a large number of small manufacturers of mineral feeds that have sprung up in various parts of the country, as well as many manufacturers of old time tonics and regulators who have engaged in this business. Most of these manufacturers have had little or no training in chemistry, physiology, nutrition or veterinary medicine, therefore do not understand the necessary specifications and requirements of the ingredients that should be used in a mineral feed; nor do they understand the nutritional requirements of cattle. The products manufactured by most of these are inefficient and under ordinary conditions cannot be expected to accomplish a great amount of good. Many of these products instead of being mineral feeds are more on the order of the tonics and regulators and several of them very closely resemble the old hog powder and cattle powder preparations that have been on the market for the last 40 years, or since Dr. Gray, an employee of the U. S. Department of Agriculture announced the Soda Salts mixture for the treatment of hog cholera.

Many of the mineral feeds now on the market are not true to the list of ingredi-

ents given because in many instances they contain such a small amount of some of the ingredients given that they cannot be of any possible benefit. There is no attempt made to balance the ingredients in many of these cheap, inferior so-called mineral feeds, nor is any attempt made to select desirable ingredients free from objectionable impurities. With many of these so-called mineral feeds, the principal factor in reaching a decision as to the ingredients used is the cost of the ingredients. In some of these mixtures there will be found ingredients that have no beneficial effect at all in a preparation of this kind, and in some instances ingredients are listed which cannot be found in any up-to-date veterinary literature.

Within the last few months the Food, Drug and Insecticide Administration of the U. S. Department of Agriculture has begun investigation of the many preparations sold to livestock owners, and no doubt many of these so-called mineral feeds will be under their scrutiny in a short time with the result that many of them will be compelled to properly balance the ingredients in their mixture and to make only such claims as can reasonably be made for the product they are selling.

XII

Some Factors Influencing Mineral Digestion

Many users of mineral feeds do not take into account that there are many factors that influence the digestion of the minerals they feed, and that if these factors are not taken into account the results are likely to be disappointing. The results secured from feeding a mineral feed will depend largely upon the observance of these facts, most of which are directly within the control of the cattle owner. Most of those factors that are not within the control of the owner, are under control of the manufacturer of the mineral feeds. Therefore, by paying particular attention to these factors on the part of both the manufacturer and the cattle owner the most efficient results may be expected from the use of the minerals used.

The manufacturer in order to insure a mineral feed that is capable of being digested in large amounts should grind the minerals very finely, because they are in the animal's digestive system but a few hours and it is evident that the fineness of grinding will have considerable to do with their digestibility. Calcium carbonate which is usually found in large amounts in most mineral feeds should be ground finely enough that 90% of it will pass through a 100 mesh screen. Calcium carbonate that is coarser than this will be poorly digested. Therefore, the animal consuming a mineral feed containing a coarse calcium carbonate cannot secure the results from it that the owner has reason to expect. The fineness of grinding of minerals should be confined principally to those minerals that are not soluble in water.

Calcium phosphate (bonemeal) should also be finely ground. Since this is a product that is usually quite coarse, particular attention should be given to securing as fine a product as possible in order that the greatest amount of it may be utilized by the animal.

The digestibility of minerals will depend in a measure upon the amount of certain other minerals that are found in the mixture. Excessive amounts of magnesium will have a tendency to prevent the digestion of calcium. Excessive amounts of calcium will also have a tendency to prevent the digestion of calcium and will sometimes cause softening of the bones, a disease

which is practically the same as the one that develops when sufficient calcium and phosphorus are not supplied in the ration. Excessive amounts of iron and silica (sand) often prevent digestibility of minerals. There is danger therefore in using natural rock products which contain these ingredients, as impurities in excessive amounts. Some forms of limestone and rock phosphate contain these ingredients in excessive amounts.



(University of Wisconsin)

This cow's ration lacked minerals; her calf died soon after being born. Rawleigh's Minerals for Cattle supply the minerals needed by the cow to enable her to produce strong, vigorous young.

Experiments at the Wisconsin Station indicate conclusively that minerals will digest more readily when cattle are supplied with an adequate amount of roughage which is rich in vitamin D, as this regulates the storage of calcium. The use of alfalfa or clover hay which has been properly cured without being subjected to rains and heavy dews is very valuable in this respect. Pasture is also very desirable and in most instances favors high digestibility of minerals.

Sunlight plays a very important part in the digestion of minerals and for this reason the dairy herd should be turned out of doors whenever possible during the winter months, even though it is only for an hour or two. They should be turned out when the sun is shining. The dairy herd that is kept housed in the stable all winter long, away from the natural sunlight will not digest as large quantities of minerals as the herd that is turned out of doors in the sunlight each day when the weather permits.

XIII

Mineral Content of the Roughage Determines Production

Cattle owners have long noticed considerable difference in the feeding value of hays produced from different parts of the farm. They have also experienced a difference of feeding value after the addition of lime or phosphorus or other fertilizer to the fields from which their crops were produced. Cattle owners whose herd have been affected with breeding disease, such as abortion have frequently reported a decided improvement in the breeding health of the herd after liming the soil which produced the alfalfa or clover hay they fed the herd.

Experiments made at the Wisconsin Experiment Station indicate that there is a great difference from a feeding standpoint with the hays produced in different sections of the state. Hay produced in one section of the state was low in minerals and cows fed on it did not produce normal living young. This hay was very low in calcium or lime.

An experiment was made at the Wisconsin Station to determine the difference between timothy and alfalfa hay with reference to the production and reproduction of

dairy cattle. This experiment shows that even though timothy hay is supplemented with calcium and phosphorus in the form of bonemeal that cows do not produce as satisfactorily nor do they produce such healthy, normal offspring as they do when fed alfalfa hay with the same mineral supplements. This experiment indicates that even though the other nutrients in the ration are supplied in sufficient amounts that calcium and phosphorus must be given due consideration as a factor in production and reproduction. Some experiments conducted at other stations to determine the value of minerals have been conducted with groups which have been fed timothy hay or a similar roughage. We would not expect satisfactory results even though minerals were added to a cow's ration that is being supplied with such a poor roughage.

The Wisconsin Experiment Station also conducted an experiment to determine whether or not dairy cows stored greater quantities of calcium when they are fed a lime and phosphorus carrier in the form of bonemeal. This experiment indicates that a cow that had received during the winter months liberal quantities of alfalfa which is rich in calcium did not store any additional amounts of calcium while on pasture even though bonemeal was added to her ration.

Another cow that was fed a calcium poor ration during the winter months did store greater amounts of calcium while on pasture when supplied with bonemeal. This experiment proves the contention we have always made that it pays to feed minerals at least through the entire winter months, and it probably pays just as well to feed them during the summer months. Although this experiment did not prove this, the number of animals used was entirely too small to enable one to reach definite conclusions with reference to this.



(University of Wisconsin)

This cow had the same ration as the other cow but she had minerals added to it; her calf lived. Cows must have enough minerals if they are to produce strong, vigorous calves.

XIV

Why Your Cattle Need Minerals Now

Many cattle owners who have not given much time to the study of the mineral needs of cattle do not understand why their cattle

should need minerals now, and why they did not need minerals several years ago. There are some very outstanding reasons

why dairy cattle require minerals now to a greater extent than they did a number of years ago, the principal ones being:

1. The dairy cow has been bred up and developed for high production.

2. There has been a great loss of minerals from the soil that has been cropped continuously.

3. There are a large amount of mill by-products used in cattle feeds.

Less than a score of years ago the average cow produced but a small quantity of milk compared to the present production. Many cows milked but a small quantity of milk for five or six months and were then dry three or four months before freshening. Such cattle produced such a small amount of milk that the owners did not feel like going to any great expense to supply them with feed, and for this reason very little attention was paid to their feed other than the roughage consumed.

At the present time a milk cow to be profitable on a good corn belt farm must produce two or three times as much milk as the average cow produced 20 years ago, to bring a profit for her owner. The average cow on a good corn belt farm must produce more than 8,000 pounds of milk to make a small profit for her owner; to make a satisfactory profit, the production must be considerably greater than this.

The average milk production in the Illinois Cow Testing Associations in 1927 was around 8,000 pounds of milk per cow.

A number of years ago, cattle were fed almost entirely on whole grains that were produced on the farm where the cattle were kept. At this time many grains are sold

for the manufacture of food products. That part of the grain that cannot be utilized for the manufacture of human food, is prepared for animal feeding. These by-products are usually deficient in minerals because of the fact that large quantities of minerals are removed with the portion that is used for the manufacture of food products.

From the above discussion, the dairy cattle owner can readily understand why his cattle have greater need for minerals than the cattle did a score of years ago.



To get best results in feeding dairy cattle they should be fed according to production. Weigh the milk also, that you may know if your cows are producing profitably.

XV

Dangers from Using Improperly Prepared Minerals

Many cattle owners do not stop to think of the dangers to their herd from using improperly prepared mineral feeds. It is just as dangerous to use a mineral feed in which there is an excess of a certain ingredient, as it is to use one in which there is a deficiency. Animals suffer in some instances just as much from an excess of a mineral ingredient as they do from the deficiency of this ingredient.

It has been demonstrated several times that an excessive amount of calcium or lime frequently results in softening of the bones which very closely resembles rickets. By

supplying the correct amount of calcium or lime there is deposited in the bones this mineral in sufficient amounts to correct this condition. This is proof that the manufacturer of mineral feeds must understand definitely the mineral requirements of the animals for which he is making the feed.

In cheap, inferior minerals there are often used ingredients which contain dangerous impurities. In a few instances these impurities are dangerous because of the fact that they are poisonous and in other instances because they have too great an effect upon the animal that consumes them.

Occasionally these dangers are not manifest in a short feeding period, but do show up after a long continued feeding of the product.

Another danger from feeding a cheap, inferior mineral is due to the fact that many of them are unbalanced. Some of these so-called minerals contain one or more minerals which are not highly desirable. In many instances these so-called mineral feeds contain very small quantities of any

mineral with the exception of calcium or lime and phosphorus. Practical feeding experience indicates that such minerals as iron, sulphur, magnesium, etc., are just as desirable and are just as often deficient in the livestock feed as is calcium and phosphorus.

It is always dangerous to use a mineral feed manufactured by any one who is not known to be sufficiently qualified to manufacture a safe product of this kind.

XVI

You Can Assist Minerals by Good Feeding

Many cattle owners get the impression that if they feed minerals the most of their feeding troubles will be over; they can feed most anything to their dairy herd and because they have added minerals to their dairy ration the results will be satisfactory. To get the best results with minerals, it is necessary to supply the herd with a complete ration. There must be sufficient proteins to balance the minerals that are being fed. The results that will be secured from feeding minerals with an unbalanced ration may not be much better than feeding them the unbalanced ration alone, because as a general thing the value of minerals depends largely upon there being sufficient other ingredients in the ration to meet the animal's requirements.

Many cattle owners believe that when they feed their cattle minerals that they can eliminate oilmeal, cottonseed meal or other proteins from the grain ration, as well as alfalfa or clover hay; nothing could be further from the truth than this. It is always advisable when feeding minerals to supply as good a ration as can be secured for the reason that minerals always make a good ration better. In the high producing herd the animals will be able to produce a

greater length of time when they are supplied a good ration with minerals than when they are supplied simply the ration without the minerals. In our opinion it is never safe, regardless of how good the ration is, to attempt to feed a high producing herd without minerals. It is always advisable to supply sufficient minerals for the prevention of any breeding disease that high producing cows will develop when they are not supplied with sufficient minerals. The dairy herd during the winter months should be kept in the sunlight as much as possible because this helps in the assimilation of minerals. Even though minerals are being fed, it is always desirable to turn the animals out of doors in the sunlight when the weather will permit.

A good roughage is also desirable; in fact it is necessary and the most satisfactory roughage for the dairy cow is alfalfa or clover hay. If you attempt to feed timothy hay, corn fodder or similar roughages with minerals, you cannot expect to get the same results as you would get by feeding alfalfa or clover hay. You will not get the results you should get and will probably not get the results you expect.

XVII

Signs of Deficiency Disease in Cattle

Usually the first sign that may be noticed when the ration is deficient in minerals is that of decreased milk production. Cows usually dry up much earlier than usual. Some cows fall off in production very rapidly; often going dry in seven or eight months after freshening. While this

may be partly due to poor feeding, in many instances it is also due to mineral deficiency in the ration.

Another sign that is usually seen in the herd that is receiving a deficient mineral supply is that of a rough, staring coat, the hair stands on end and the hide clings



Goldie Soldene Korndyke produced 30.88 pounds of butter from 615 pounds of milk in 7 days; she produced in 366 days 946.84 lbs. of fat from 27,528.80 pounds of milk.



Lady Piebe Oak Homestead the 1927 Illinois State Champion in 500 pound fat club with a production of 844.2 pounds of fat from 25,829 pounds of milk.



Goldie Homestead Korndyke has milked as much as 105 pounds of milk in one day; her 7 day record is 26.18 lbs. of butter from 683.1 pounds of milk.

Rawleigh's Minerals for Cattle Fed to These Cows

The Holstein herd at Rawleigh's Ideal Farms were fed on Rawleigh's Minerals for Cattle for more than a year before this mineral feed was placed on the market; at this time (April, 1928) they have been on this feed for two years.

Rawleigh's Ideal Farm Holstein herd has more state records in Class A than any other herd of its size in Illinois; it has 25% of the state records in Class A. The general herd average for every cow in the herd for 1927 was 515 pounds of fat and 15,670 pounds of milk. This is four times the production of the average cow in

the United States and twice the average production of all cows in the cow testing associations in Illinois.

We have always fed our herd on the best balanced grain mixture and supplied the best roughage we could grow on our farms; but even though we feed a balanced ration at all times we have found that our herd has produced more consistently and larger amounts of milk since we have been feeding Rawleigh's Minerals for Cattle. It pays us to feed this mineral feed and it will pay you. You can increase the profit from your herd and improve their general health by feeding Rawleigh's Minerals for Cattle.

MANUFACTURED BY

THE W. T. RAWLEIGH CO.
FREEPORT, ILL., U. S. A.

MEMPHIS CHESTER OAKLAND MINNEAPOLIS RICHMOND DENVER
MONTREAL WINNIPEG



Otter Creek Joe produced 33.26 lbs. of butter from 677.1 lbs. of milk in 7 days; she produced 939.78 lbs. of butter from 24,610.9 lbs. of milk in one year.



Rawleigh Canary Ormsby as a senior 2-year-old produced 867.925 lbs. butter from 17,502.4 lbs. milk.



Rawleigh Ormsby Pietertje Posch our herd sire is out of Pietertje Ormsby Mercedes Frisby.



Pietertje Ormsby Mercedes Frisby World's Record Jr. 2-year-old; 32.91 lbs. butter from 452.10 lbs. milk; as a Jr. 4-year-old 41.15 lbs. butter from 698.2 lbs. milk. First 41 lb. Cow in Illinois.

tightly to the body. The animal is said to be hide bound.

Another sign and probably the most outstanding one is probably depraved appetite. With this condition cattle eat old bones, tin cans, cornstalks, manure and other indigestible and undesirable materials. This is a very common condition and in driving through the country it is not unusual to see one or more animals in many herds that are affected with this disease.

Stiffness in milking cows is another very common sign of mineral deficiency. This condition is rapidly increasing each year. Affected cows walk with a stiff, straddling gait and show some lameness. This condition gradually becomes worse, and after a time the animal's joints will creak as it walks. In some sections of the United States it is known as creeps. This condition often increases until the animal is no longer able to get upon its feet. The owner usually is of the opinion that the animal is

affected with rheumatism. Affected cows will frequently live several weeks after they are no longer able to get on their feet.

When the mineral deficiency has progressed to the point that the animals are affected with depraved appetite or with stiffness, they do not usually breed. Some of these animals do not even come in heat.

The offspring from the herd that has been receiving a ration that is deficient in minerals are usually small and weak at birth. Some of them are unable to stand upon their feet and in most instances they die within 48 hours. The calves from cows that have not been receiving sufficient minerals usually do not develop normally. In many localities where there is a deficiency of iodine, the calves are born with goitre or big neck. Our experience has been that iodine is one of the most important minerals that can be supplied to the breeding cattle herd.

XVIII

Mineral Deficiency Causes Breeding Diseases

When the ration of a high producing dairy herd is deficient in minerals for any great length of time, there is usually considerable trouble from breeding diseases. Under extreme conditions many owners will suspicion contagious abortion or some other serious disease of this nature in their dairy herd.

One of the first breeding diseases that is likely to be encountered is that of shy-breeding. The cows in the herd will come in heat regularly, but for no explainable reason they do not get with calf. This is known as shy-breeding and in some herds it affects the entire number. In most herds there are only a few animals affected.

Another breeding disease that frequently results when they do not receive sufficient minerals is that of irregular heat periods in the breeding females. When this disease appears in the herd the animals that are affected do not get with calf and in extreme cases, some become sterile.

In extremely high producing herds where these conditions occur, it is not unusual for some abortions to occur; abortions that are not caused by contagion or infection. In most herds, only a small number suffer from abortion disease due to this cause, but in extreme cases entire herds have been known to abort. This is probably best demonstrated by the small percentage of abortions that take place in those herds where there have been no reactors to the blood test for contagious abortion for several years.

For use with those animals that have aborted from a mineral deficiency, the use of minerals would be found very satisfactory. Even where there is contagious abortion present the use of minerals with the other necessary procedure will be very helpful. The results will come from increasing the vigor and by improving the general health of the herd.

XIX

Depraved Appetite in Cattle

Depraved appetite, commonly known as pica, is a very common condition affecting milk cows in several different sections of the United States. In Southwestern Minne-

sota, in Montana and on the coastal plains of Texas many cattle are affected with this disease. This disease manifests itself in the animals chewing old bones, stones, and other indigestible and undesirable products. This condition has been observed in Southwestern Minnesota for the past 25 years or more. It has become so common that many farmers look upon this as a condition that can be regularly expected each year. In other sections of the United States this disease occurs occasionally and at least an animal or so in many of the herds will show evidence of this trouble.

In herds where this condition becomes quite prevalent there is usually considerable breeding trouble experienced in the herd; cows come in heat irregularly or fail to come in heat at all, or some of those that do come in heat do not get with calf.

Cattle with depraved appetite will often eat the mangers and stanchions when they are made of wood, and we are frequently told by dairymen having such equipment in their barns that they find it necessary to replace this equipment nearly every year because their cattle eat it up when suffering from this disease. Young calves suffering from this disease will frequently attempt to eat the brick and mortar from

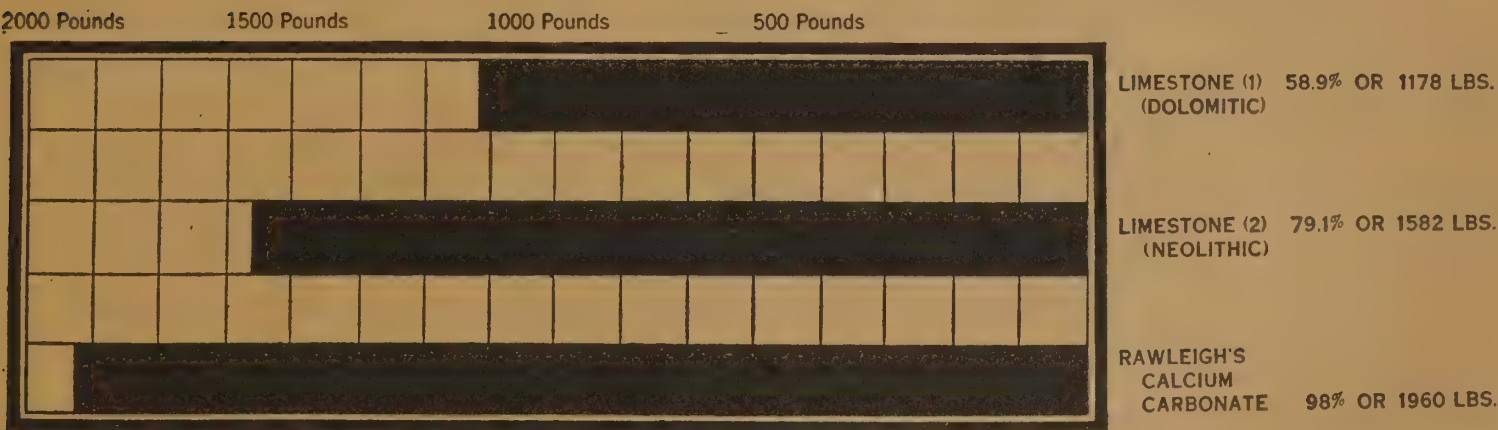
between the bricks and tile when kept in a building with such a wall. Other calves that have been housed in lots where there are low buildings have been known to stand with their front feet against these buildings and eat the shingles from the roof. Cattle affected with this disease usually are thin in flesh, have a rough, staring coat and show the usual signs of unthriftiness.

Cows that are in milk as a rule do not come in heat until after they are dry; therefore, many of them produce one calf only every two years.

There is considerable difference in the severity of this condition in different animals in the herd as shown in the herds in Southwestern Minnesota, as well as in the other areas where this condition is common. Some animals may be very seriously affected, while others will be so slightly affected that it will be scarcely noticeable.

It is quite generally believed that in herds affected with this condition that by feeding alfalfa or clover hay that it can be prevented. This does not hold true in all instances, because in Minnesota where experiments have been carried on for some time it has been found that even though alfalfa or clover hay is fed to these herds in

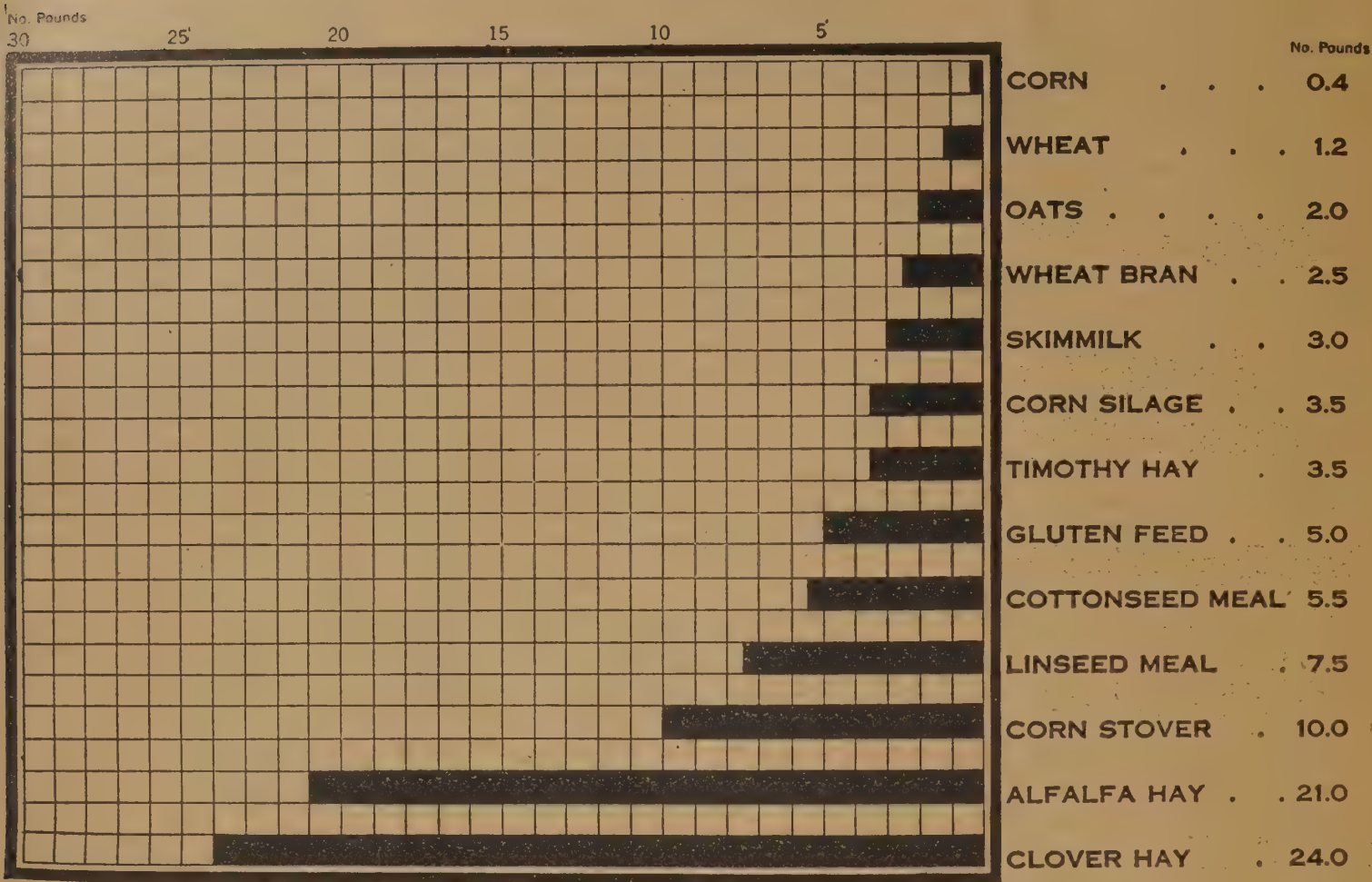
AMOUNT OF PURE CALCIUM CARBONATE IN EACH
2000 POUNDS OF SOME COMMON MATERIALS
USED FOR FEEDING CATTLE



In dolomitic limestone which we find in several of the States, the calcium carbonate content may be as low as 533 lb. and the magnesium carbonate content may be as high as 910 lbs. Excessive quantities of magnesium prevent efficient use of the calcium. It is generally believed that a lime carrier to be very effective should not contain more than 5% to 10% of magnesium. Some dolomitic limestone contains as much as 375 lbs. of silica (sand). Manufacturers of mineral feeds using ordinary ground limestone often use a limestone of the dolomitic variety and for this reason the results the user secures from such a mineral feed are likely to be disappointing.

In ordinary limestone that is found in most sections of the United States, we sometimes find a calcium carbonate content as low as 1348 lb. in 2000 lb. of ground material and in addition to this, there is as much as 380 lbs. of silica (sand) per ton. The manufacturer of so-called mineral feeds using ordinary ground limestone is likely to secure a product that contains no more calcium carbonate than we have given here, and in addition to that, contains the large amount of undesirable sand which is not only objectionable, but in large quantities may be dangerous.

AMOUNT OF CALCIUM IN ONE TON (2000 LBS.) OF SOME COMMON FEEDS



normal amounts that depraved appetite or pica occurs just the same in the cattle. The alfalfa produced in this country grows without the addition of any extra lime, therefore we conclude that this alfalfa is of normal richness as far as lime is concerned.

The feeding of calcium phosphate (bone phosphate of lime), a product rich in lime and phosphorus in the form of bone-meal

prevents this condition in the herds, and in those that were affected it brought about a cure. While the Minnesota experiments are the only controlled experiments to date showing the value of using lime and phosphorus in the form of calcium phosphate for preventing or curing this condition, many cattlemen have discovered that the use of these minerals will prevent or cure this condition in their herds.

XX Stiffness in Milk Cows

This condition makes its appearance in the dairy cow in late winter or early spring. This occurs after the herd has been on dry feed for several weeks or a few months.

The first symptom that is noticed is that of difficulty in walking. There is a decided lameness in one or both legs and the gait is stiff and straddling. This difficulty in walking gradually increases. There may be a crackling of the joints and in severe cases, this may be heard 15 or 20 feet.

While some cattle owners consider this a form of rheumatism, others believe that the animal has slipped and injured herself. As a general thing, the milk flow rapidly decreases.

After a short time the animal has difficulty in getting upon its feet. The animal may continue to rise with assistance for some little time and will usually be able to stand after being helped up. After a certain length of time the animal will no

longer be able to get upon its feet or to stand if assisted to rise. The appetite of the affected cow remains nearly normal, and the animal appears to be in good health. Cows affected with this disease may live several weeks after they are unable to get upon their feet and will usually eat heartily all the time. Death does not usually take place quickly.

The cause of this disease

This disease is caused by the cow removing from her body larger amounts of calcium and phosphorus than is being supplied her in the feed. Due to the withdrawal of these large amounts of minerals from her body, the joints of the spinal column or backbone enlarge and press upon the spinal cord with the resulting stiffness or lameness. As the disease progresses, there is usually enlargement of the joints of the legs, which also increases difficulty in walking. It is usually due to the enlargement of the joints of the spinal column that produces paralysis.

All bone growth takes place from the ends of the bone through cartilages located there. Nature in an attempt to supply minerals for the bones naturally enlarges the

cartilages of the joints. If the proper minerals are supplied there will be a decrease in the size of the joints and the minerals will be supplied to the bones themselves. In young animals this condition is known as rickets. In mature cattle this condition is known as osteomalacia (softening of the bones). This condition is usually found in cows that are heavy milkers. The ration of affected cows has usually consisted largely of cereal grains and their by-products. Cows that have been fed large quantities of alfalfa or clover hay, oilmeal, cottonseed meal, bonemeal or minerals are rarely affected with this disease.

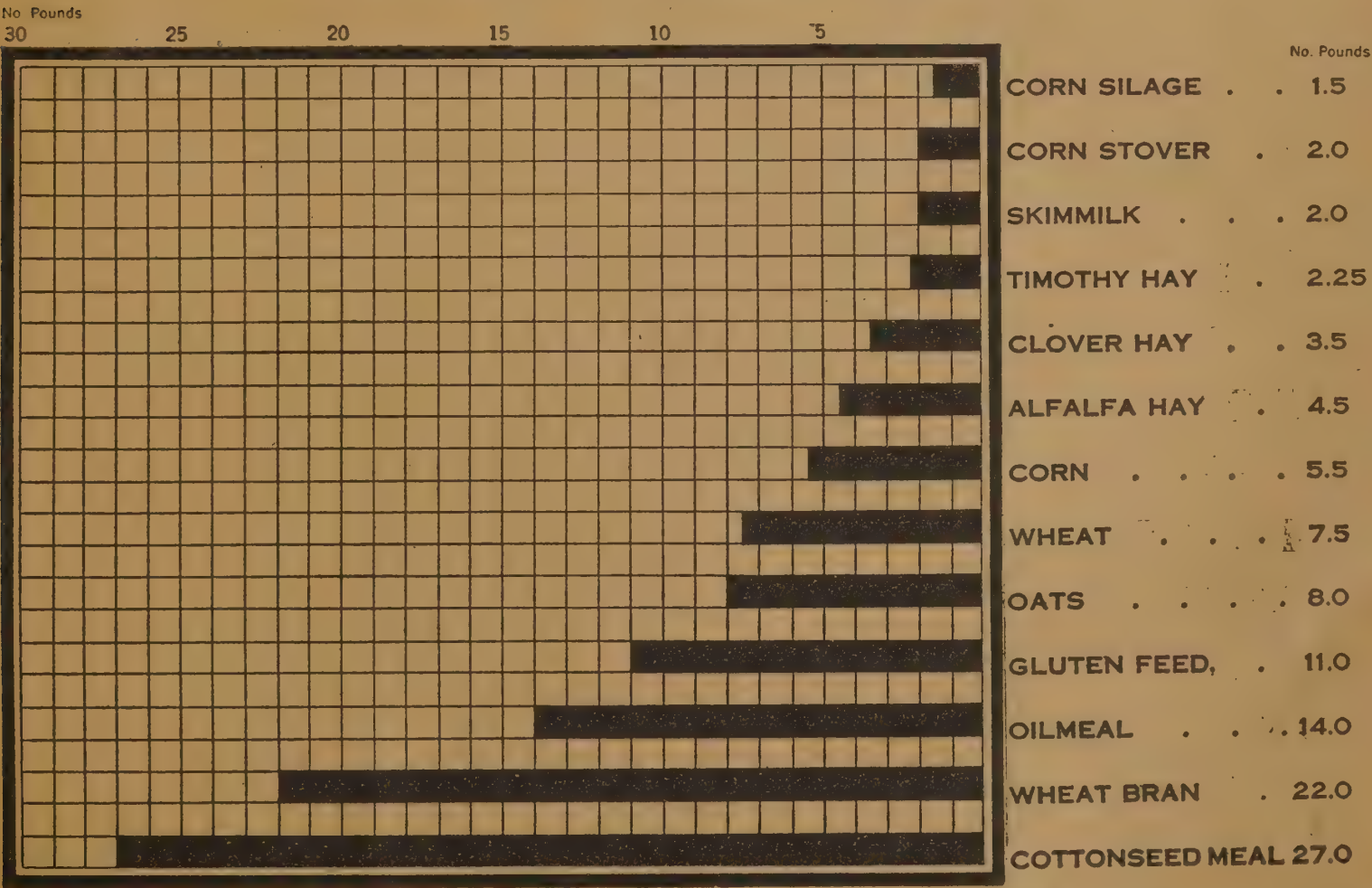
How to prevent this disease

We would suggest the following ration for the prevention of this disease in the dairy herd:

- 300 lbs. ground corn
- 300 lbs. ground oats
- 300 lbs. wheat bran
- 100 lbs. oilmeal
- 20 lbs. Rawleigh's Minerals for Cattle.

With the above grain mixture there should be fed 30 to 35 lbs. of corn silage and 10 to 15 lbs. of alfalfa or clover hay.

AMOUNT OF PHOSPHORUS IN ONE TON (2000 LBS.) OF SOME COMMON FEEDS



Other grain rations could be devised to which Rawleigh's Minerals for Cattle could be added and the same results would be secured.

Cows showing symptoms of deficiency disease should be dried up 2 to 2½ months before freshening. This will give them an opportunity to store up minerals in their body.

XXI

Bone Chewing of Cattle

Bone chewing is one of the most commonly noted visible symptoms of mineral deficiency in cattle, and in some sections of the United States, particularly in the state of Montana, cattle have been observed chewing bones for the last 20 years or more. In this state, the grass which supplies most of the feed for the cattle is of very poor quality as it is very low in minerals and the wild hay made from this grass is likewise poor in minerals. The cattle that are fed principally on this mineral deficient pasture or hay usually develop bone chewing in late winter or early spring. There is a wide variation in the number of animals affected and the severity of the attack. In many herds the general condition of the breeding animals is such that their offspring are weak and unthrifty at birth and there is a high mortality among them. There is considerable abortion in such herds. This disease, according to livestock authorities in Montana, is rapidly increasing. This is probably due to the fact that the better lands are being cultivated for field crops.

Observation of many of these herds by experienced livestock men indicate that when the cattle are deprived of the necessary amount of minerals they develop the customary weakness of the bones with the usual lameness that results from such a condition. The joints become swollen, the legs crooked and some of them even become sway-backed or hump-backed in appearance. If such animals are not supplied with the necessary minerals they soon get down and are unable to get upon their feet.

Bone chewing disease in Montana manifests itself only in late winter and early spring after the animals have been fed on wild hay for some time. In a few sections of the state this condition is so severe that some of the cattle will chew bones practically the entire year. Even the badly affected cattle usually improve considerably after they are turned out to pasture a few weeks. This disease can be prevented or even cured in the herd by supplying minerals of the right kind.

XXII

Do Not Lose Your Calves from Goitre or Big Neck

In many sections of the United States a large number of calves are born with goitre or big neck. It is reported that in some sections fully 90% of the new born are affected with this disease unless the breeding females have been supplied with iodine while carrying their young.

Disease not always recognized

A large number of young animals are lost each year through iodine deficiency in their mother's ration, yet the exact cause is not recognized by the owners. Many young are born apparently normal, but for some reason not generally recognized cannot

stand and nurse. Such animals usually die in a few hours. They are dull and listless when born and usually lie on the ground or floor with their forefeet extended and their head resting between their forelegs. If supported on their feet they will make no attempt to nurse, and as soon as the support is taken away they will immediately slump to the ground or floor. If the skin of these calves is examined it will be found to be thick and heavy. It is not loose, pliable and soft like the skin of normal young. They usually die within 48 hours. This condition is the result of iodine deficiency in the mother's feed.

Many herds have calves of this kind born each year until they begin the use of iodine or supply iodine to their breeding cows. One reason many cattle breeders have not used iodine for their breeding cows is because there was no cheap and convenient method of using it. This problem has been solved by The W. T. Rawleigh

Company, who have added potassium iodide to Rawleigh's Minerals for Cattle. You cannot afford to take chances with your cattle herd because there is often a great loss when the bred herd is not supplied with iodine. There is no better way to supply it than through the use of Rawleigh's Minerals for Cattle.

XXIII

Better Young from Mineral Fed Cows

One of the most important advantages that the cattle owner secures from the feeding of minerals is better offspring. In many high producing herds where the vitality of the herd has been reduced through high production for several years the offspring are weak and unthrifty at birth, do not develop properly and occasionally outbreaks of scours, pneumonia and other diseases cause heavy losses. In many herds these heavy losses can be greatly reduced and sometimes entirely eliminated through the improvement of the mineral content of the ration.

In some herds where there is a deficiency of iodine in the ration the calves at birth will be weak and listless and can not stand unsupported. Such calves make no attempt to nurse when supported on their feet and just as soon as the support is released they slump to the floor or ground and remain in this condition until death relieves them. Many calves in this condition will lie flat on the ground or floor with the forelegs extended and with their head resting on the ground or floor between their forelegs. These calves appear normal in every respect with the exception that their hide is thick and stiff. It is not soft and pliable as is the hide of normal, healthy calves. Iodine in the dam's feed while carrying her young would have prevented this condition and we know of no better or any more economical way of supplying it than through the use of Rawleigh's Minerals for Cattle.

In many sections of the United States many of the calves born are affected with goitre or big neck. This condition is plainly seen shortly after birth. Such calves must be treated with iodine in order to

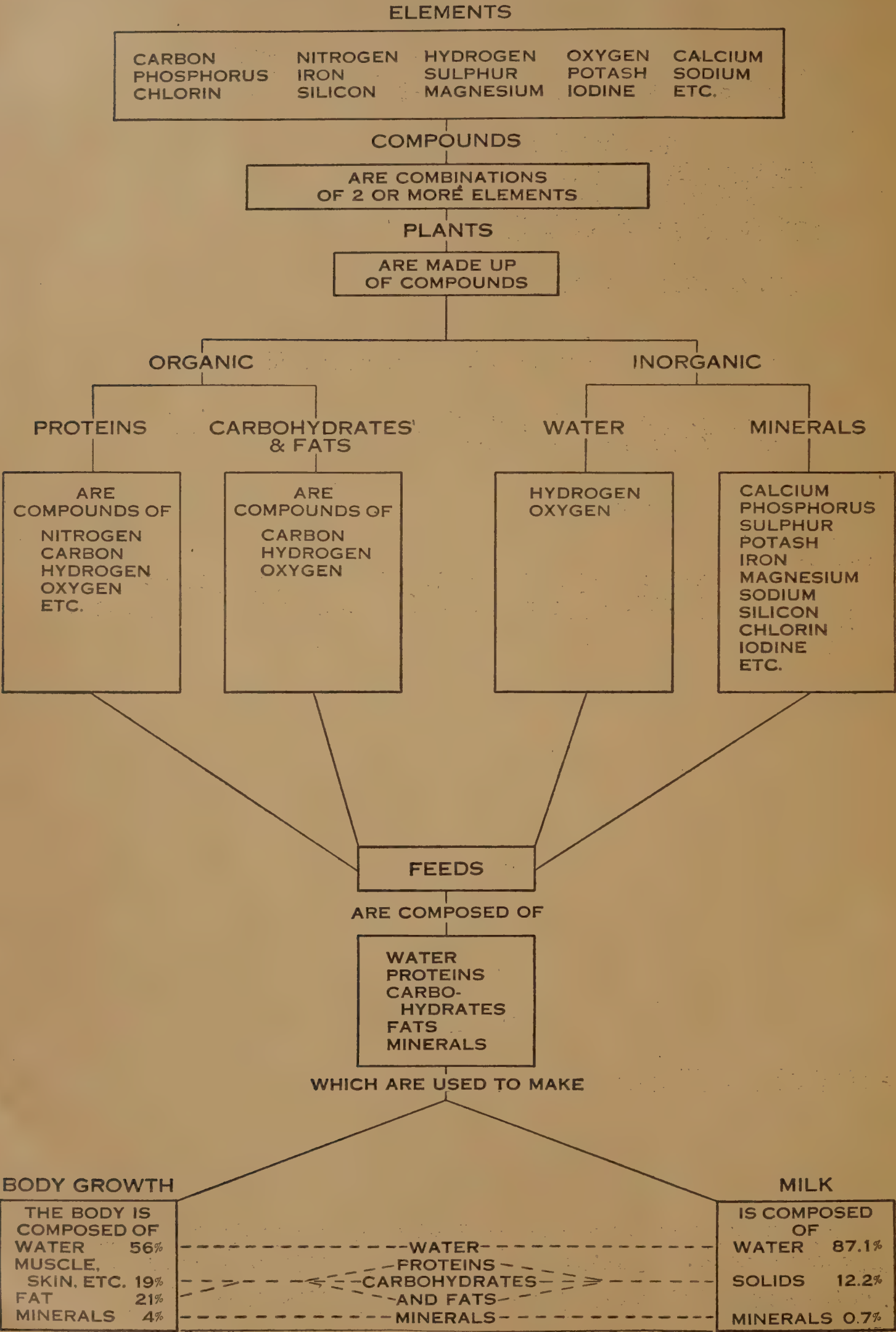


overcome this condition. This disease should be prevented in young calves by supplying the bred cows with iodine during the time they are carrying their young. This can best be accomplished by the use of Rawleigh's Minerals for Cattle.

Experienced dairymen will recall that at certain times the young calves born in the herd are weak and unthrifty and that the losses are unusually high due to scours, pneumonia and other diseases. In many instances this weakness in the calves is due to the fact that their dams were not supplied with a complete ration, and in most instances this deficiency is of minerals.

The calves from a mineral fed herd develop very rapidly and the experienced cattle owner has no difficulty in noting the fine condition and the satisfactory growth calves make when their dams have been supplied with a good mineral mixture.

HOW THE ESSENTIAL ELEMENTS ARE USED FOR
BODY GROWTH AND MILK PRODUCTION



There are about 80 known chemical elements; of this number about 15 are known to be necessary for maintaining life. A study of the chart on the opposite page will illustrate how these elements are found combined as feeds which the cattle eat for the purpose of producing body growth and for making milk. It will be observed that minerals are one of the four necessary ingredients required for body maintenance and for making milk. A deficiency of minerals is therefore just as serious as any of the other ingredients.

XXIV

How Minerals Increase Production

Cattle owners who have used minerals for a sufficient length of time know that minerals do increase production, but until they have had actual feeding experience with minerals they are likely to have the wrong idea of how the increase in production is brought about. This failure to understand just how this increased production takes place has been one reason many cattle owners become dissatisfied with such products and refuse to use them long enough to get results. Minerals do not show increased production in the dairy herd through stimulation the same as tonics and appetizers usually do, but the increased production is brought about through the lengthening of the lactation period. Cows secrete milk just as long as their bodies contain the ingredients in the required amounts that are used in the composition of milk. For a certain length of time, and until a certain point is reached, a cow will withdraw certain minerals from her skeleton to be used in the production of milk. However, after a certain point is reached, nature protects the health of the cow and the well being of her unborn offspring by decreasing milk production to the point where it is no longer necessary for the cow to withdraw large amounts of minerals from her own body.

The minerals that are required in largest amounts for milk production are calcium and phosphorus. These are likewise

the minerals that are most abundantly supplied in common feeds. Other minerals, such as iron, potash, sodium, magnesium, chlorine, etc., are also needed and if these minerals are supplied in the ration the cow will milk a longer time than she otherwise would milk.

In herds where minerals have been fed for several months many owners find it difficult to dry their cows off in time to give them a rest before they freshen again. Cows that would ordinarily be dry from six to eight weeks usually milk up to within two or three weeks of calving time and it is this lengthening of the lactation period that brings about the increase in milk production. Many cows when not supplied with the necessary minerals in sufficient amounts will dry up at the end of six or eight months. Many such animals when supplied minerals will milk one and one-half to three months longer than they ordinarily do.

As a general thing the production of the cow is considerably higher the year following the feeding of minerals. In many animals this increased production amounts to several hundred pounds in one year. In some herds the increase in production amounts to a few hundred pounds per cow as an average for the entire herd if minerals have been fed for at least one complete lactation period.

XXV

Use Minerals Long Enough to Get Results

The first decision that should be reached by the dairyman who begins the use of minerals with his herd is to the effect that he will use minerals long enough to get noticeable results. Under ordinary conditions this means that they must be used at least throughout one entire winter season. A better way than this would be to use the minerals one entire year. By so doing the results will be so outstanding and

so noticeable that there will be no longer any question in the cattle owner's mind about the value of minerals for his herd.

The cattle owner who uses minerals for three or four weeks with his herd and expects to notice results is likely to be disappointed. Minerals do not show results quickly, nor in the same manner that tonics and regulators show results. It requires sufficient time to build up the animal's

mineral reserve and under ordinary conditions this means at least several weeks or a few months. Since cattle do not consume large amounts of minerals in the summer months, it is always best to decide to use minerals at least for one complete year. There can then be no question about the results secured, and the owner will be convinced of the value of minerals in his ration.

The results that can be expected from using minerals in this way, are:—

1. Better general condition of the herd which is evidenced by carrying more flesh.
2. The animals will not dry off as quickly as when they do not have sufficient minerals.
3. The offspring from mineral fed animals are stronger and more vigorous and develop more rapidly.

XXVI

Minerals Do Not Cure Contagious Abortion

Many cattle owners get the impression that minerals cure contagious abortion. They have probably gotten this impression from salesmen who have made such statements. There is absolutely no truth in the statement that minerals will cure contagious abortion, although we believe that a high grade mineral feed can be used to very good advantage in the control and eradication of this disease.

There are two common forms of abortion disease in cattle; one is known as contagious or infectious disease, and the other is known as abortion from mineral deficiency. To all outward appearances they are identical. The only way they can be differentiated is by drawing a small quantity of blood from the animal and having a blood test made to determine whether or not the abortion was due to infection or not.

There are probably a greater number of abortions resulting from mineral deficiency than is ordinarily believed. From a rather extensive experience in observing the re-

sults from mineral feeding, we have learned that the intelligent use of minerals is always very helpful in the control of contagious abortion in the dairy herd. Since the infection causing this disease is taken up with the feed or drinking water, it is evident that sanitation is of greater importance than minerals, although minerals should always be used to build up the animal's natural resistance. You should not under any condition expect minerals to cure contagious abortion in your herd, but under no condition should it be left out of the program you employ for this purpose.

Regardless of the strictness with which you quarantine your herd and the thoroughness with which you clean and disinfect where aborting animals have been kept, results show that you will get much quicker results in eradicating this disease from your herd where the resistance is built up by proper feeding. Minerals should always have an important place in your feeding program for the control of this or any other disease.

XXVII

The Amount of Minerals You Should Buy

The quantity of minerals you should buy at one time will depend upon the length of time elapsing between the trips made by the Rawleigh Retailer. The Rawleigh Retailer usually makes from four to six trips each year, and under average conditions it would be well to figure one trip in the fall, one during the winter and one in the spring. On this basis you should buy enough minerals to last your herd at least two months. If the length of time between trips is longer than this, then buy enough

minerals to last until the Retailer comes again.

When using Rawleigh's Minerals for Cattle, it is well to figure 6 lbs. per month per cow and from 2 to 3 lbs. for young stock per head per month. Therefore, if you have 10 milk cows and 5 head of young stock, 200 lbs. of Minerals will last you between two and three months. It is generally safe to figure that 100 lbs. of minerals will supply 15 cows for one month.

There is only one advantage in buying in small quantities, or in purchasing only sufficient amounts of Minerals to last two or three months and that is that you do not need to pay for the Minerals you use only as they are being used. Most Retailers will make a reduction in price if you purchase your entire winter season's requirements in the fall of the year. Most Retailers will make sufficient reduction in price that it

will pay you to purchase your Minerals in larger quantities.

Most Rawleigh Retailers will leave you a quantity of Rawleigh's Minerals for Cattle on Time and Trial, and therefore you have had the use of these Minerals before you need to pay for them. This is quite a distinct advantage from the buyer's standpoint and one that the regular manufacturers of mineral feeds do not extend to you.

XXVIII

What Does It Cost to Feed Minerals?

Many cattle owners insist that it is expensive to feed minerals and say that they cannot afford it. The reason it seems to them expensive to feed minerals is because they think only of the price paid for 100 lbs. of minerals as compared to the price paid for 100 lbs. of grain feed or other feed that is supplied the herd. The cost of feeding minerals should be considered from the standpoint of a year's feeding the same as the other feed with which the cow is supplied under ordinary conditions. The average cow will consume from \$100.00 to \$125.00 worth of feed in one year. The cost of feeding minerals to the average cow

for one year will amount to \$2.50 or \$3.00, or from one-fortieth to one-thirtieth the cost of the grain and roughage she consumes.

From the results secured from feeding a good mineral mixture with a properly balanced ration to the dairy herd, we believe you will have no difficulty in understanding that this is a very profitable feed to use, and that it is one of the cheapest you can use in your herd. The fact that a few hundred pounds per year will supply a large herd of cattle proves the statement that we make that it is one of the cheapest feeds you can employ for your herd.

XXIX

Adding Your Own Salt Reduces the Cost

Most purchasers of mineral feeds insist that they prefer to add salt to their own mineral feed or at least not purchase a mineral feed with which salt has been mixed. They maintain that there is no necessity for their paying a second freight charge on the salt that is included in the mixture when they already have salt for use with their herd. The W. T. Rawleigh Company concludes that this idea is correct when sufficiently large amounts of salt must be added to a product which will greatly increase the amount of freight that must be paid. Therefore, there is no salt in Rawleigh's Minerals for Cattle.

Most mineral feeds on the market which are recommended for cattle feeding contain 25% or more of common salt. Therefore, when you purchase the ordinary mineral feed on the market you are actually purchasing 75 lbs. or less of the minerals you cannot supply yourself to your herd and 25 lbs. or more of common salt upon which

you must pay transportation charges and other necessary overhead expenses. Therefore, in figuring the cost of most minerals delivered to you, you should figure that the total cost of the minerals to you should be apportioned to the 75 lbs. or less of actual minerals you find it necessary to purchase. On this basis, suppose that you are purchasing 100 lbs. of the ordinary mineral feeds on the market at \$6.00 per 100 lbs. Suppose that this mixture contains 25 lbs. of salt as most of them do, or even more. Then you have paid \$6.00 for 75 lbs. of minerals or at the rate of 8 cents per lb., or \$8.00 per 100 lbs. This is a reasonable position to take because you feed your cattle salt anyway and you must keep salt on hand at all times; therefore, you can just as well add this small amount of salt at a very small cost to the mineral mixture you purchase.

There is no salt in Rawleigh's Minerals for Cattle; therefore, you secure 100 lbs. of

minerals, none of which you can supply to your herd nor any of which you can conveniently supply them from any material you ordinarily keep on your farm.

Suppose you pay the Rawleigh Retailer \$7.50 for 100 lbs. of Rawleigh's Minerals for Cattle, and add 30 lbs. of salt to 100 lbs. of minerals (which makes it the same rate of salt as is usually found in the other mixtures) at an increased cost of not more than 25c in addition to what you paid for 100 lbs. of Rawleigh's Minerals for Cattle or a total of \$7.75. This is at the rate of 6 cents per lb., or \$6.00 per 100 lbs. for Rawleigh's Minerals for Cattle after the common salt has been added. You can readily see by studying these figures that the mineral manufacturer who offers the ordinary mineral mixture containing 25% or more of salt is still making just as much profit when he sells this mixture at \$6.00 or thereabouts per 100 lbs., as The W. T. Rawleigh Company and the Rawleigh Re-

tailer when they supply you with Rawleigh's Minerals for Cattle at a price of \$7.50 per 100 lbs.

As a general thing when you are purchasing ordinary mineral feeds on the market, it is well to figure that if they contain salt that you are not getting more than 75 lbs. of actual essential minerals that you cannot supply from materials you already have on your farm because of the salt the mixture contains. Therefore, it is always well to figure that the product is costing you one-third more than the price actually stated by the salesman or dealer because you supply your cattle with salt anyway and have it regularly on hand.

When you use this method of figuring which is fair to all concerned, and above all to yourself, you will readily understand that you can use Rawleigh's Minerals for Cattle just as cheaply as any other reliable mineral feed on the market.

XXX

Rawleigh's Manufacture a Quality Mineral Feed

Your results with a mineral feed will depend upon how well you select the feed you use. If you select a feed that meets the following specifications and use it properly, you are sure to get satisfactory results. Quality in mineral feeds is dependent on:—

1. Selection of the necessary minerals.
2. Use of the most satisfactory form of each mineral.
3. The use of ingredients free from indigestible or dangerous impurities.
4. Proper balancing of ingredients, fineness of grinding and complete mixing.

In the Rawleigh Organization are several individuals that have been especially trained in such a manner that they are familiar with the above requirements, and for this reason you can be assured that you secure as good a mineral feed as it is possible to make in light of our present knowledge.

In addition to our Veterinarian and our Herdsman, both of whom are graduates of one of the leading agricultural colleges and one of the well known veterinary colleges, we have several graduate chemists and pharmacists who are always ready to lend the necessary assistance in the selection of

ingredients and in the development of a satisfactory manufacturing process.

We have an unusual opportunity to try out products under actual herd conditions and in this connection we wish to state that we have used Rawleigh's Minerals for Cattle for the past two years (for more than a year before we announced this product) in our own herd.

Our Holstein herd which numbers 32 head of milk cows has established more state records according to the size of the herd in Class A for the Holstein breed than any other herd in the state of Illinois. We have established 25% of the records in this class. Every one of these records have been made by animals that have been either bred or developed by us. We do not buy animals with records.

Many so-called mineral feeds are simply the formula given by some experiment station or some college worker, or a modification of such a formula on the part of the manufacturer. As a general thing, the manufacturer of mineral feeds has little or no theoretical training, nor do many of them have any practical experience which can be used to advantage in making a de-

sirable product. Most manufacturers are entirely dependent upon the knowledge they secure from others; therefore, the product they manufacture and distribute cannot be expected to be of the same high quality as a product that is manufactured by those who have first-hand knowledge with which to work. It requires an intimate and complete knowledge of veterinary medicine, chemistry and animal nutrition to manufacture a quality feed, and without any attempt at being egotistical, we believe we are correct in saying that there is no organization in the United States that has such a large number of individuals trained in these various sciences in their employ, that are engaged in the manufacture of mineral feeds.

Rawleigh's Minerals for Cattle Are Different

Rawleigh's Minerals for Cattle contain only those minerals that are known to have

a definite use in cattle feeding. No ingredients are used simply because someone thought they might be helpful. Ingredients are not selected because of their cost, but because of their value in feeding cattle. Many so-called mineral feeds, especially the cheaper ones contain many ingredients that are of doubtful value. Rawleigh's Minerals for Cattle are more economical than any cheaper minerals, because they are highly digestible; contain no indigestible or dangerous impurities; are finely ground and properly mixed and correctly balanced to get best results.

You can be assured that when you use Rawleigh's Minerals for Cattle that you are using a product that is the result of scientific and practical experience in the feeding of cattle. You need not worry that you are feeding a product that contains these indigestible ingredients that we have mentioned.

XXXI

Advantages in Buying Rawleigh's Minerals for Cattle

There are several advantages that the average cattle owner may secure by purchasing Rawleigh's Minerals for Cattle. In the first place the Rawleigh Retailer will usually leave a supply of Rawleigh's Minerals for Cattle sufficiently large to feed your entire herd until his next trip. You have the privilege of using these minerals and getting results from them before you need pay for them. In purchasing Rawleigh's Minerals for Cattle from the Rawleigh Retailer you purchase only in small amounts; usually 100 or 200 lbs., and because the Rawleigh Retailer calls regularly on you every few weeks there is no necessity of his selling you an entire winter's requirements at one time. Most mineral feed salesmen who sell no other products feel that they must sell large quantities in order to make it profitable for them.

Another advantage in purchasing Rawleigh's Minerals for Cattle is the fact that they do not contain any salt or cheap filler, both of which add considerably to the cost because you can supply your own salt and when filler is used you are paying for material from which you cannot get satisfactory results.

Probably the most important advantage in purchasing Rawleigh's Minerals for Cattle is the fact that you can be assured that they are properly manufactured of only high grade ingredients and that they have been actually used for a long time in one of the highest producing dairy herds in the United States, where results have been very outstanding. Most manufacturers of mineral feeds that we are familiar with do not have any dairy cattle and must only depend upon what they observe in a few herds where their minerals may be used.

Rawleigh's Minerals for Cattle are based on the amount of actual essential minerals required, and are actually from 10% to 25% cheaper than most of the minerals now sold on the general market.

You can always depend upon Rawleigh's Minerals for Cattle being the same quality at all times, because each ingredient is bought according to a certain specification and certain tests and analyses are made in our own Laboratories to determine whether or not these materials are up to the standard we require in our Products.

XXXII

Some Common Cattle Diseases and Conditions With Suggestions for Treatment

Garget of the udder

Garget (or mammatis as it is usually called by the veterinarian) is a very serious condition that often affects milk cows; serious because of the injury to the affected part of the udder.

Do not attempt to secure a cure without lessening the yield of milk; do not attempt to keep the milk flow normal, be satisfied to save the affected part of the udder if you can. Another common mistake is that of heavy feeding during treatment.

Reduce the grain feed half and do not feed any corn; reduce the protein to not more than 12% to 15%. Give the cow a laxative of epsom salts as a drench; an average dose in such conditions is one pound. Take the chill off the drinking water if weather is cold. Milk the cow from the affected parts of the udder every two or three hours during the time that swelling and pain is most severe.



Massage the udder thoroughly with Rawleigh's Camphor Balm two or three times each day immediately following milking. This is one of the best preparations for this purpose that can be secured. Rawleigh's Medicated Ointment is also satisfactory and should be used when Rawleigh's Camphor Balm is not available.

For foot rot or foul foot

Take a wooden barrel and saw it in two pieces, one of them being 8 or 10 inches deep; better put a false bottom in it to keep the animal from breaking through. Take $\frac{1}{2}$ pint of Rawleigh's Kreo or of Rawleigh's Dip and Disinfectant for each 5 gallons of water and place in this tub; stand the animal in this tub for two or three hours each day.

Lousy Cattle

Rawleigh's Louse Killer is an excellent preparation to use; it should be brushed through the hair over the entire body, especially under the belly and inside the legs.

Another satisfactory method of treatment consists of using a mixture of 2 parts

of Rawleigh's Kreo to 1 part of Black Leaf 40; use 3 tablespoonfuls to each gallon of water and apply with large sponge or cloth to every part of the body. Rub dry with a heavy cloth if the weather is cold; repeat in 10 days or two weeks.



Bloating

Cattle are particularly liable to bloat during the late winter or early spring or when first turned to pasture in the spring. When cattle are badly bloated it usually requires very quick treatment if they are to be saved. We would recommend that a supply of Rawleigh's Colic and Bloat

Compound be kept on hand at all times for use in such emergencies. Where the herd is of some size several bottles should be kept, because if more than one animal becomes bloated, one bottle might not be sufficient. Valuable for cattle of all ages.

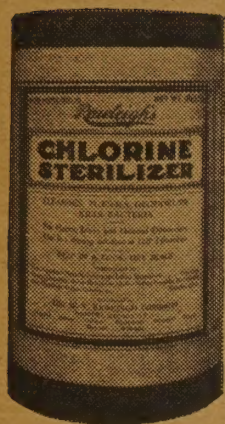
How to dry up a cow

Every cow should be dry from four to six weeks and extremely high producing cows from six to eight weeks; this rest period enables them to store fat and minerals in their body that they will need for making milk.

The first thing to do is to milk only once each day if the cow is giving less than 10 pounds, then remove all grain and feed only lightly of hay; if timothy or mixed hay can be had this should be used; after two or three days of this feeding, milk only every other day. Use Rawleigh's Camphor Balm and rub it into the udder thoroughly after each milking; if the cow is milking around 10 pounds per day better get some fluid extract of belladonna and give her a teaspoonful night and morning, in a little water as a drench, for two or three days.

After the milk flow is less than 3 or 4 lbs., you need not milk any longer and even though the udder swells considerably, it will go down rapidly after a few hours and the milk will be absorbed.

Farm and dairy disinfection



The dairyman, the farmer, and the housewife have long been in need of a chemical sterilizer, deodorant, and cleanser that could be used for containers in which dairy and food products were kept, as well as for use about the home, farm and dairy. These uses require a product that leaves a clean surface, that is easily

used, that is effective, and also cheap in price. Rawleigh's Chlorine Sterilizer has all of these desirable qualities.

Rawleigh's Chlorine Sterilizer is useful for sterilizing and cleaning all dairy equipment made of metal or glass as it does not corrode metal. For the purpose of cleaning, deodorizing and sterilizing containers and equipment used for milk, dairy products, ice cream and other food products, and for cleaning and deodorizing ice boxes, coolers, refrigerators and other places and equipment where food products are stored will be found very satisfactory and efficient. It is non-poisonous. It is 40 to 45 times as strong as carbolic acid for general disinfection.

Rawleigh's Chlorine Sterilizer is the result of a modern chemical discovery and is manufactured under a patented process. Do not be misled into believing that other chlorine products are just as good. All other makes of chlorine or chemical sterilizers that we know of have many objectionable features. They are not as satisfactory as Rawleigh's Chlorine Sterilizer.

Rawleigh's Chlorine Sterilizer is easy to use, as it is simply mixed with water and the container or object to be sterilized and cleaned is simply rinsed or scrubbed with the solution. It is packed in 2½-pound cans only. Each can will make 100 gallons of solution of satisfactory strength for general sterilization.

Increase the quality of your dairy products by sterilizing your equipment and containers with Rawleigh's Chlorine Sterilizer. The Rawleigh Retailer can supply you with this Product. Ask him to leave you a supply the next time he calls.

Kreo, a Permitted Disinfectant for Official Disinfection

For many years, Consumers of Rawleigh Products that owned cattle herds that were being tested for tuberculosis have prevailed upon us to manufacture and supply them with a disinfectant which could be used for disinfection after the tuberculin test has been made in their cattle herds and reactors have been removed from it. Such a disinfectant must be made from specifications furnished by the United States Department of Agriculture. After long deliberation, we finally decided to manufacture such a Product, and on January 30, 1928, Rawleigh's Kreo was approved as a permitted disinfectant and listed in circular letter No. 1508 which was published by the United States Department of Agriculture. Rawleigh's Kreo, therefore, can be used for disinfection of the barns, stables or quarters where cattle have been kept that have reacted to the tuberculin test, as well as for disinfection of stock cars, boats, stock yards, loading shoots, etc.

If you contemplate testing your herd for tuberculosis soon, you should secure a supply of Rawleigh's Kreo from the Rawleigh Retailer the next time he comes, and have it on hand in case you need it. The inspector will compel you to secure a "permitted disinfectant" and will usually insist that you do so promptly in order that you may clean up and disinfect at the earliest possible date.

If you do not use this Product for disinfection after the tuberculin test has been made, you can use it for general disinfection. It is a very excellent Product for this and the results you secure will be very satisfactory.



If you desire any additional information about Rawleigh's Kreo that the Rawleigh Retailer cannot supply you, write us and we will supply the information if we can. Rawleigh's Kreo is packed only in 1-gallon cans.

E. A. LEVAN
The Rawleigh Retailer,
1119 E. COURT
IOWA CITY IOWA

GOOD FEEDING

improves the health of your herd
and increases your profits

Experienced cattle owners recognize the fact that the health of their herds, as well as the profits they secure, is determined largely by the manner in which their herd is fed. It pays to feed the dairy cow liberally and always a balanced or complete ration. With the increasing use of mill by-products and with the decrease of the mineral elements in the soil, due to long, continued cropping without their being adequately replaced, there is usually a serious mineral deficiency in the ordinary cattle ration.

In an effort to supply the dairy herd with the minerals they require, there has been developed of late years products that are known as mineral feeds. In order that a mineral feed may bring the greatest value to the herd to which it is supplied, it must be made of high grade ingredients which are highly digestible, which contain no dangerous impurities and no great amount of inert material.

Rawleigh's Minerals for Cattle do not contain any ground limestone, rock phosphate or salt. Salt is very desirable for cattle, but every cattle owner supplies his herd with salt anyway; therefore, there is no necessity of his purchasing this ingredient in a mineral feed and paying excessive freight rates on it. Many of the so-called mineral mixtures and those



that usually sell at a cheap price contain large amounts of such materials as ground limestone, ground rock phosphate, wood ashes, etc. Some of these products are not more than one-half to two-thirds digestible; still other so-called mineral feeds contain ingredients which contain poisonous impurities, and because of the low price, many cattle owners are influenced to purchase them and use them with their herd. You can afford to pay twice as much for

Rawleigh's Minerals for Cattle as you could afford to pay for many other so-called mineral feeds now on the market. Rawleigh's Minerals for Cattle give you greater feeding value for the money you spend for them than others, and there are no dangerous impurities which may produce serious or fatal results in your herd.

Quality should be the first consideration when you purchase a mineral feed, and in this respect, we believe that Rawleigh's Minerals for Cattle are in a class by themselves. The quality of Rawleigh's Minerals for Cattle will be remembered long after you have forgotten the price. Remember that there is not a manufacturer of mineral feeds in America that is in any better position to give you any greater value in minerals for cattle than The W. T. Rawleigh Company.